

MASTOCUTANEOUS ROTATIONAL FLAP TO REPAIR TISSUE LOSS SECONDARY TO DEEP STERNAL WOUND INFECTION

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Summary

Deep sternal wound infections can have devastating consequences and tissue loss, especially in the case of postoperative mediastinitis or when bone tissue is involved. It often requires complex and repeated surgical solutions in addition to reconstructive procedures that include flaps and grafts with adjacent tissue and muscle when tissue loss is present. In the reported case, a rotational mastocutaneous flap was performed to cover significant tissue loss following a deep infection of the longitudinal median sternotomy in a patient with aortic valve replacement.

Key words: deep sternal wound infection, postoperative mediastinitis, rotational flaps, breast flaps, thoracic muscle flaps

INTRODUCTION

In cardiovascular surgery, the longitudinal median sternotomy, described by Milton in 1897, is the preferred incision due to its unsurpassed exposure. Its widespread use, beginning in 1957, is attributed to Julian and colleagues, who explained its advantages ¹⁻⁴.

Infections of this incision are classified as superficial, deep, and organ-space infections ⁵. Although rare, deep infections can have devastating consequences and tissue loss, especially in postoperative mediastinitis or when bone tissue is involved (osteomyelitis) ^{2,5}. It often requires complex and repeated surgical solutions, in addition to reconstructive procedures that include flaps and grafts with adjacent tissues and muscles ^{2,4}.

The pectoralis major muscle has long been the preferred method since its description by Jurkiewicz in 1979. It has also been performed with the rectus abdominis muscle and the greater omentum ^{4,6,7}.

Breast skin wrapping can be used to close defects arising after extensive excision of the breast and adjacent elements. Its main challenge is identifying the skin area to be preserved and its vascularization ⁸.

In the authors' opinion, its use in closing adjacent wound-healing defects in the thorax has been little studied and may offer an option.

Blood supply to the breast tissue and the skin of the anterior chest wall ensures the viability of the flap. This is supported by: branches of the axillary and internal thoracic arteries, perforating branches of the intercostal arteries and the subdermal plexus ⁸⁻¹⁰.

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The following aspects must be respected when using thoracic flaps: complete debridement, ensuring coverage, avoiding dead spaces, and achieving aesthetic results¹¹.

Significant tissue loss requires complex flap reconstructions. The most common causes are tumors, radionecrosis, and infections, the latter of which include deep sternal wound infections^{12,13}.

In the reported case, a rotational mastocutaneous flap was performed to cover significant tissue loss following a deep infection of the longitudinal median sternotomy.

CASE REPORT DESCRIPTION

We present a 67-year-old female patient with a history of smoking and chronic obstructive pulmonary disease who had been experiencing dyspnea on exertion for months. She experienced syncope, and severe aortic stenosis was diagnosed by echocardiogram with elevated transvalvular gradients, normal left ventricular ejection fraction, and abundant calcium in the valvular apparatus. Cardiac surgery was performed through a longitudinal median sternotomy for aortic valve replacement by a



Figure 1. Mastocutaneous rotational flap.

mechanical prosthesis, with extracorporeal circulation. There were no intraoperative or immediate postoperative complications.

Seven days later, a change in skin color and discharge were detected in the lower third of the surgical wound. Between the eighth and ninth days, necrosis of the described area was noted, with plaque-like tissue demarcation. The subsequent necrectomy resulted in significant tissue loss in diameter and depth. *Klebsiella pneumoniae* was isolated in the cultures, and treatment with meropenem was administered and continued with daily dressings until the cultures became negative and granulation tissue was established.

Since closure by secondary intention was impossible, a third intention was decided upon, but coverage of the significant tissue loss, measuring 8 x 5 x 3 cm, was needed. Given the location of the defect, the breast was preferred as it was the closest adjacent structure. The rotational mastocutaneous flap was raised from the lower inner quadrant of the right breast (Fig. 1), in an ovoid shape with the pedicle close to the defect, allowing the perforating arteries of the intercostals, especially those of the fourth space, as well as the medial mammary branches of the internal thoracic artery to ensure perfusion, and the veins to drain. The dimensions were adequate to cover the defect. The width of the pedicle guaranteed the preservation of the subdermal plexus that supplies the skin of the flap. The breast fat was used to eliminate dead spaces, and the skin was used to cover the tissue loss. The healing of the flap 6 months after surgery can also be seen in Figure 2. The patient did not consent to photographing the area of necrosis and tissue loss.

DISCUSSION

It is not common to use breast tissue in flaps to cover chest wall defects. More frequently, the opposite occurs, from the chest to reconstruct the breast^{12,14}.

Acea B et al.⁸ refer to upper and lower breast flaps for breast defects. To cover chest wall defects, they only mention the use of bilateral advancement flaps, frequently from the abdomen. Similar to what Aquino BM et al.¹¹ reported in their presentation of a patient with a breast and chest wall tumor, they perform coverage with a rotational flap from the abdomen. In general, breast tissue is used only to reconstruct the breast itself^{14,15}.

Likewise, Long B et al.¹⁶ described a case of a large chest wall tumor, the resection of which was successfully covered with a rectus abdominis muscle flap.

The presentation of several patients who required chest wall reconstruction by Lasso JM et al.^{1,2} reaffirms the



Figure 2. Healed flap at 6 months.

use of adjacent muscles, but not the breast. Monzón A et al.¹³ also use them and report their long-term results. To cover defects caused by sternal wound infections following cardiac surgery, other adjacent tissues are preferred, such as the pectoralis major, rectus abdominis, and latissimus dorsi muscles, in addition to the greater omentum^{2,4,6,7,17-19}.

Due to the location of the defect described, the pectoral muscle could not be used in this patient, as its higher position would require extensive tissue removal for flap creation and would also require complete reopening of the incision, with a high probability of not achieving full coverage. The rectus abdominis muscle could be used in an ascending flap, which would have the disadvantage of extending the incision into the abdomen. In

both cases, it would require a larger healing surface and insufficient dermal coverage.

Knowledge of the vascular anatomy of the integuments is essential^{8,20}.

CONCLUSIONS

Breast tissue can be used to cover chest wall defects secondary to deep sternotomy infections after cardiac surgery, when conditions permit. This is when the defect is close to the breast and this tissue has no proven disease, and as long as its viability is guaranteed.

Conflict of interest statement

The authors declare no conflict of interest.

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Author contributions

NAC: A, D, S

GBY: A, DT, W

Abbreviations

A: conceived and designed the analysis

D: collected the data

DT: contributed data or analysis tool

S: performed the analysis

W: wrote the paper

Ethical consideration

Not applicable.

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